Radial and Elliptic Flow and the Equation of State in a Hydrodynamic Model with a Cascade Afterburner

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Abstract

We have constructed a model of non-central heavy ion collisions which uses relativistic hydrodynamics to describe the early partonic stages of the collision and a hadronic cascade, RQMD, to describe the late freeze-out stages of the collision. The dependence of radial and elliptic flow on the Equation of State(EoS) used in the hydrodynamic stage is systematically studied. For an EoS with a first order phase transition, the model reasonably describes both the radial and elliptic flow at the SPS. Further, the model clarifies why pure hydrodynamics predicts too much elliptic flow at the SPS. With the parameters of the EoS fixed from the available SPS data, we make flow predictions for RHIC. Within the model, radial and elliptic flow increase significantly from the SPS to RHIC. This increase is in good agreement with recent STAR elliptic flow data

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